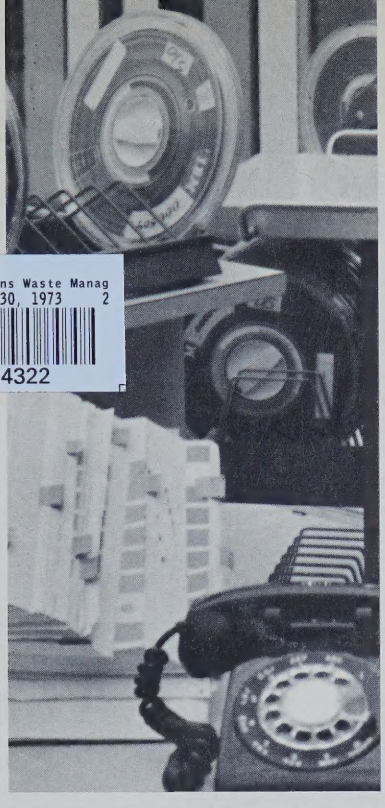
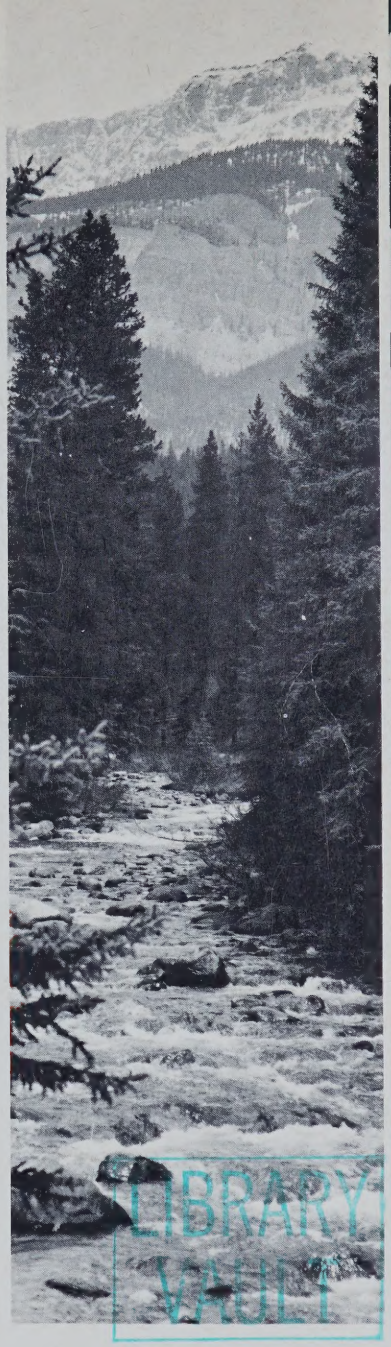
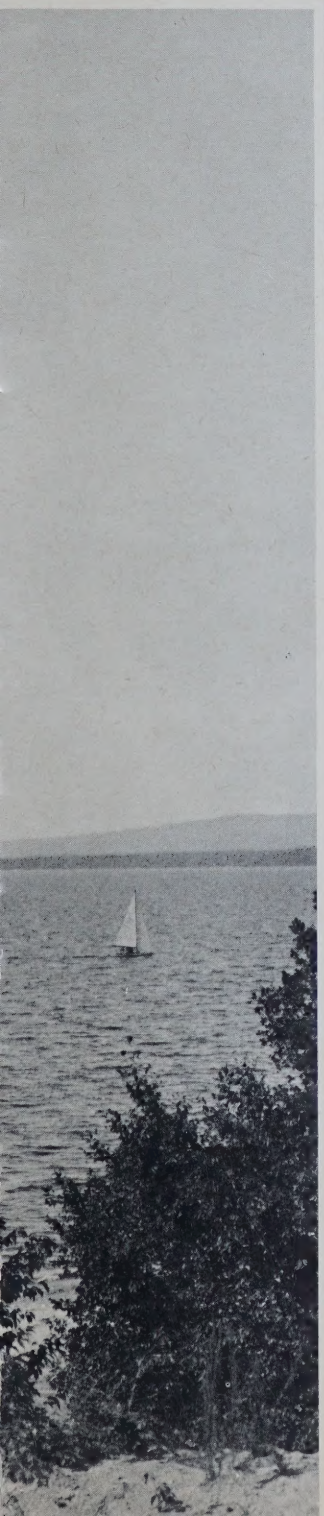
CA2ALEN 90
72L35
c.2

CA2 ALEN 90 1972L35
Alberta Livestock Operations Waste Manag
ement Survey 1972. March 30, 1973 2
3 3398 00309 4322







alberta
department
of the
environment

HON. W. J. YURKO, MINISTER

DR. E. E. BALLANTYNE, DEPUTY MINISTER

LIBRARY
VAULT

JUL 13 1982
EDMONTON

ALBERTA LIVESTOCK OPERATIONS WASTE MANAGEMENT SURVEY 1972

STANDARDS
AND APPROVALS
DIVISION

Digitized by the Internet Archive
in 2025 with funding from
Legislative Assembly of Alberta - Alberta Legislature Library

ALBERTA LIVESTOCK OPERATIONS

WASTE MANAGEMENT SURVEY

1972

Digitized by the Internet Archive
in 2025 with funding from
Legislative Assembly of Alberta - Alberta Legislature Library

https://archive.org/details/ableg_33398003094322

ACKNOWLEDGEMENT

This publication was prepared jointly by the cooperative efforts of Mr. Brian West, Agricultural Engineer of the Alberta Department of Agriculture, who directed the field survey of livestock operator interviews during the summer of 1972, and by staff of the Alberta Department of the Environment who reviewed the numerical responses provided in the questionnaire forms. The Intensive Livestock Operations committee which consists of membership from the producer organizations and the provincial agencies also provided additional guidance and direction.

SURVEY OF WASTE MANAGEMENT

ON ALBERTA LIVESTOCK OPERATIONS

SUMMER, 1972

This survey was conducted under the supervision of the Intensive Livestock Operations Committee. This committee comprised of members from the Departments of Environment, Health and Social Development, Municipal Affairs, Agriculture and Labour. Also represented were the University of Alberta and farm organizations (Western Hog Growers Association and Alberta Cattle Commission). Other individuals were called upon as well to provide specific inputs.

ABSTRACT

A survey of livestock operations during the summer of 1972 studied animal waste management techniques on Alberta farms. Considerable difficulty was encountered in quantifying pollution possibilities on farms due to variations in management, location and the local situation. Subjective evaluations by the interviewers were necessary to obtain the desired results.

Pollution on farms did not appear to be a general occurrence but rather local problems on individual farms caused by poor management, location, topography or in some cases, an irresponsible attitude. Most farmers would not intentionally pollute and are receptive to new economically feasible techniques to prevent such occurrences. It appeared that an educational approach to animal waste management would curtail most potential pollution problems rather than a tough regulatory one.

Urban development and its associated conflicts with agriculture was found to be the greatest problem of the livestock industry. There is a very urgent need for orderly land use planning (or zoning) to prevent urban encroachment on established agricultural operations.

TABLE OF CONTENTS

	PAGE
OBJECTIVES	1
PROCEDURE	1
RESULTS	2
IMPACT OF LIVESTOCK OPERATIONS	3
MANAGEMENT SYSTEMS	4
FARMERS REACTION	6
OVERALL SUMMARY	8

SUMMARY OF LIVESTOCK SURVEY 1972 - CARRIED OUT BY THE INTENSIVE LIVESTOCK OPERATIONS COMMITTEE

OBJECTIVES:

The original objectives of the survey were the following:

1. Determine the number of feedlots in Alberta
2. Categorize livestock operations according to size
3. Establish the location of livestock facilities with regards to watercourses, people, and other developments
4. Establish the type of drainage or waste disposal practiced
5. Establish residual effects of wastes in soil. (This objective was not followed up because of its technical nature)

The intensive livestock operations committee discussed the above objectives and added a more general one as follows:

"To assess animal waste management systems on Alberta farms and their impact on the environment under varying natural environmental conditions and geographical locations. The survey should also serve to assess the need for regulations and define areas of needed research and education so that environmental problems can be prevented".

PROCEDURE:

The Intensive Livestock Operations committee discussed the project in view of the preceding objectives. It was determined that a province wide survey was beyond the capabilities of our available manpower. The survey, therefore, was restricted to four major areas based on four selection parameters.

1. High human population
2. High livestock population
3. Location of livestock operation with respect to surface water, groundwater, soil type and climatic variation.
4. Species of livestock

The four regions surveyed were: Edmonton, Red Deer, Calgary and Lethbridge. In addition to these regions, a few interviews were made in the Peace River area. This North-South cross section takes in most soil zones, climatic differences and population distributions.

Seven Summer Temporary Employment Program employees were hired by the Department of Environment to conduct the field interviews. Two were situated in Edmonton, Red Deer and Calgary respectively. The Lethbridge area was surveyed from Calgary. A third man was situated in Red Deer for part of the summer. All students had farm backgrounds with formal agricultural training.

The survey questionnaire was developed in consultation with all committee members. The final format of the questionnaire was such that statistical tabulation of results could be computerized.

An orientation session at the beginning of the program was held by the project leader in an attempt to establish consistency amongst the interviewers. A regrouping meeting was also held half-way through the project to evaluate progress to that point.

RESULTS:

The results outlined in this report are a summary of the subjective feedback submitted by the interviewers on completion of the project. This feedback related to the environmental aspects of livestock production in Alberta. A statistical data summary from the interview answer sheets is to be compiled in a separate report.

Sampling was a slight problem particularly with beef and swine operations due to lack of producer information. A wide stratification of production units as to size was obtained for most types of operations in spite of this problem. Most interviewers felt they had learned all they were going to learn after the first 25-30 farm interviews. This might suggest that perhaps there is not the variation in livestock operations that had been originally thought.

Co-operation from farmers was generally good. A few would not consent to

interviews and a few just did not have time. Quality of interviews varied from region to region, even though all the interviewers had been briefed together as a group. Varying scale of operations and business attitudes in the different regions may have contributed to varying interview quality. The number of interviews made in the Edmonton area was low; however, they were very thorough. The highest number of interviews was made in the Red Deer area but there were three interviewers employed in this area for most of the summer. A summary of the number of interviews made is as follows:

TOTAL INTERVIEWS

Northern Region	117
Central Region	265
Southern Region	155
TOTAL	537

FEEDBACK HIGHLIGHTS:

The following points indicate the main areas of concern as reported by the interviewers involved in the project. Most observations and farmer reactions were similar in each area.

IMPACT OF LIVESTOCK OPERATIONS

a] On Water

Most farm operations handle or dispose of manure in traditional ways - ie. land spread or stockpiled and landspread. Most farmers usually prefer to work manure into the land as soon as possible.

Where land spreading was considered too costly, too time consuming or impossible, potential pollution problems were usually found to be small and confined within the limits of the operation or farm.

It was reported that relatively few operations were located where they posed an environmental hazard. The southern region was estimated to have less than 5% of the operations posing a possible problem, while the Red Deer area estimated to have less than 10%. This assessment does not mean

that the stated percentage of farms are necessarily polluting but rather they have a definite potential to do so.

Obvious pollution problems situations were attributed to a management problem, to irresponsibility or in a few cases, to ignorance. It was considered that there is sufficient technical knowledge available at present to prevent nearly all water pollution.

b) Odor Nuisance

Most interviewers felt odor is the most urgent problem facing the agricultural industry, particularly in the Calgary, Lethbridge and Edmonton areas. Considerable urban sprawl is occurring around these areas and it was found that even conventional methods with good management is not enough in many cases to prevent odor.

The Red Deer study did not find odor nuisance to be a major concern at this point in time.

There does not appear to be any practical method available at present to prevent some odor from occurring around intensive livestock operations.

MANAGEMENT SYSTEMS

Intensive Livestock waste management systems were rated approximately as follows in decreasing order of effectiveness.

a) Dairy

Generally very good waste management employed in dairies and as a result, they seem to contribute very little to pollution problems.

Dairies usually have enough acreage available to dispose of manure.

Cleanliness and sanitation is important in a good dairy operation and this is reflected in the waste management.

Dairies tend to locate close to market centres, so they could have land use and odor problems in the future.

b) Poultry

Poultry rated second because of the lesser amount of manure produced.

Poultry housing is quite highly capitalized and technically developed.

The poultry industry is more prepared to try new methods, e.g. dehydration, incineration, etc.

Problems arise due to trend of poultry operations locating on small land holdings near to urban centres, ie. insufficient land available in many cases for disposal and close proximity to urban development creates conflicts.

c) Hogs

Hog operations tend to be well distributed geographically so land disposal is not generally a problem.

Water pollution is not usually a problem with the present trend towards confinement housing and enclosed liquid manure systems.

Odor is the big problem as most people find hog manure odor very offensive. Lagoon systems were found to bring complaints from non-hog producers and urban neighbours.

Location of hog operations with respect to neighbours is very important.

d) Beef

Beef operations rated last due to the double potential to both air and water pollution.

Beef facilities are not developed to the point of other confinement systems, therefore, operators do not have the same degree of control over beef wastes.

Most operations manage manure acceptably provided they have sufficient land.

Feedlot locations along watercourses may have problems due to runoff. Very few have employed runoff control precautions.

Odor can be a continuous problem on large lots but is a periodic one on small lots usually when the manure is removed.

FARMERS REACTIONS

a) Urban Development

Many older operations seemed to be waiting for urban development to reach them so they "can sell their property for a real good price and get out of farming".

Recently established or highly capitalized operations saw urbanization as a threat to their operation since "there is no way that the good price of land would compensate them for their investments".

Many farmers simply do not like to see good agricultural land being used for urbanization.

The odor problem is primarily a people problem ie. when urban and agricultural development are permitted in the same area each with their conflicting interests.

Many farmers commented on the lack of consistant land planning which would serve to protect both sides.

More onus should be placed on the urban dweller to investigate residential locations in rural areas before complaining about "rural odors". At the same time, farmers must use discretion, be responsible in their operations and considerate of their neighbours.

Many farmers feel there is a double standard, ie. urban residences should not be allowed to develop near existing livestock operations in the same way as livestock operations are not allowed to be developed near existing urban settlements.

b) Regulations

All interviewers reported that farmers generally felt a need for regulations, providing they were not too restrictive.

Many farmers are worried about the possiblity of regulations for the sake of regulations.

There must be a mechanism available to rectify obvious problem situations but which will not interfere with the average farm operation.

Farmers want justification for regulations; many felt that regulations would cause more harm and nuisance than good for the environment.

General regulations are needed which can be broadly interpreted and under which serious violators could be treated individually.

Farmers want to know how any proposed new regulations would be administered.

Any new regulations should be province wide but must be flexible enough to take into account varying localities and situations; perhaps such regulations should be locally administered.

c] General Waste Management

Most farmers considered there was no major problem or cause for concern with spring runoff from manure spread on snow.

Many farmers felt that manure spread on snow melts more rapidly so nutrients from manure are more likely to be dissolved into the soil early in the spring before the major runoff occurs.

Many farmers complained because they had insufficient manure to meet their needs.

In many areas [depending on soil type] manure is spread on higher land which needs manure the most. Since the snow melts earlier on such locations, it was felt there was little chance of much runoff. Note: Little research is available which can either support or refute the above comments on manure runoff from frozen land.

Several farmers were concerned with the pressures of the economy where it seems necessary to be large in scale in order to survive. This creates problems many of which are similar to those of big business and removes many of the aesthetic values associated with country life.

Farmers are generally quite conscious of damage being done because they work closely with the environment.

Many farmers complained about disposal of dead animals and the lack of rendering plant services.

d) Education

Interviewers felt this could be a very effective way of preventing agricultural pollution. It may take more time but would likely be more successful in the long run than an enforcement approach.

The agricultural industry could benefit much from an educational program as well as educating the general public about what is actually going on at the farm level.

Government services could do more in disseminating information about waste management.

Many additional comments were included in the reports and questionnaires, however, the above includes those most often heard.

OVERALL SUMMARY

The following points could be made as a result of the survey.

1. Pollution from livestock operations at present "seemed" to be minimal. Problems are generally rather isolated local occurrences caused by poor management, location and/or proximity to urban development.
2. The degree of pollution was impossible to assess on most farms and the effect of varying weather conditions complicated this even more.
3. The majority of farmers would not intentionly cause pollution - but some may be polluting without knowing it. They would like to be better informed on agricultural pollution and are generally receptive to new techniques providing these are tried, tested, and economically feasible.
4. Urban development definitely is regarded as a threat to the agricultural industry. The urban-rural conflict must be examined and action taken towards comprehensive, consistant land use planning or zoning. Responsibilities for application of zoning laws need to be laid out in clear detail. It is recognized by the Intensive Livestock Operations committee that this area is basic to the entire problem of controlling conflicting environmental and industrial interests.

5. Odor nuisance appears to be the most difficult agricultural pollution encountered with respect to corrective measures and regulations.

6. There exists a need for increased research in animal waste management. Topics for further study include: land application rates; odor control; nutrient runoff from frozen land; manure additives; lagoon design; feedlot runoff; groundwater movement; low cost manure storage; dehydration and incineration.

7. Regulations concerning animal wastes are acceptable to most farmers providing they prevent the obvious pollution problems without being overly restrictive and providing such regulations protect farmers against urban encroachment.

SURVEY OF WASTE MANAGEMENT

On Alberta Livestock Operations

Summer, 1972

Statistical Review

C O N T E N T S

		Page
Summary		1
Introduction		2
Discussion		2
Conclusions		8
Table I		9
Appendix A	Results of the Questionnaire	10
Appendix B	Sample Questionnaire	37

Summary

1. Most livestock operations surveyed were well separated from urban developments.
2. While groundwater was by far the most important source of water for domestic purposes, both ground and surface water supplies were used extensively for livestock.
3. Run-off water from confinement areas of beef feedlot operations were not generally controlled.
4. Dairy, swine, and poultry operations were generally well managed and capital-intensive.
5. Virtually all livestock operators canvassed for the survey used land spreading to dispose of manure; most livestock operators spread manure on snow.
6. Very few operations used lagoons.
7. Very few livestock operators encountered complaints and this would indicate that problems were negligible.

Introduction

This Statistical Review was prepared as an appendix to the subjective report entitled "Survey of Waste Management on Alberta Livestock Operations". produced under supervision of the Intensive Livestock Operations Committee in the summer of 1972.

Overall, the quantitative results clearly support the subjective results. Percentages are based only on number of responses rather than number of questionnaires since many sections applied only to specific types of operations. Approximately 530 questionnaries were tabulated, but number of responses may exceed 530 if a question allowed more than one response (e.g., water sources for farm).

Response rates are only estimations, based on average number of responses for questions in the respective section.

Discussion

1. Introductory Questions

Most Livestock operations studied were in rural areas (questions 5 and 7) and fairly spread out (question 2, 3, and 8). Rendering services were the most common deadfall disposal method, but farmers' comments indicated that more rendering services are needed (question 9).

2. Water Sources

Most operations use both surface water and groundwater, with groundwater predominating, especially for domestic purposes (question 10 and 20).

A. Surface Water

Casual surface water, and both continuous - and intermittent - flowing creeks,

rivers or springs are used about equally for L. O. purposes, but most domestic water comes from intermittent flowing sources (question 11). Most surface water is diverted using unlicenced dugouts of varying sizes, but 30% of L. O. surface water is undiverted (question 13, 14, and 15). For domestic water, pressure systems predominate, but most L. O.s use free access and pressure systems as methods of water delivery (question 16). Most residences used surface water year round, and L. O.s used it in summer or year round (question 17). In winter, most people and L. O.s used pressure systems, (question 18). Few had experienced water shortages (question 19).

B. Groundwater

Many wells were 80 - 150 feet deep, but depth varied considerably (question 41). Only 28.9% of wells were screened (question 42), and 33.2% had a slotted casing (question 43); however, 66.8% were not just open holes (question 44) and most domestic and livestock wells (77% and 68% respectively) had had a water analysis done (question 45). Well capacity varied evenly (question 46), and 16.3% of respondents had experienced a water shortage at some time. Domestics wells tended to be more separated from L. O. than livestock wells (question 48), and almost all people and L. O.s used a pressure system to deliver water (question 49). Almost all respondents used groundwater year-round.

19.9% of the respondents indicated they had alternate water sources to the ones described above.

3. Beef Operation Details

A. Cow-Calf Operation

For Cow-Calf operations, of the 68.7% who confined animals (question 1), length of confinement varied more or less evenly between 3 - 6 months and 6 - 12 months (question 2), and most (69.7%) used pasture-type confinement (question 3).

B. Feedlot Systems

There were over twice as many responses to the questions on feedlot systems as there were to those on cow-calf operations. Of these responses, 44.1% indicated a confinement area per animal of 200 to 400 sq. ft., and other responses varied evenly (question 1). Virtually all (96.2%) feedlots were of the open-dirt type (question 2) and most (86.8%) were in operation 6 - 12 months per year (question 3).

C. Information on Feedlot or Confinement Areas

Feedlots used considerably more bedding that cow-calf operations (question 1, Information on Feedlot or Confinement Area). Most operations were situated on relatively flat land but 56.3% of the confinement areas and 79.7% of the feedlots were subject to run-off problems (question 2). 79.7% of the beef operations were situated on clay or clay-loam subsoils, which might indicate problems with the incorporation of manure into soil, and, again, a possible run-off problem (question 3). 32.6% of the operations had continuous or intermittent drainage off property (question 4) and 88.4% failed to indicate any abatement procedures whatsoever (question 5). Run-off could become a serious problem without careful control, even though over half of the operations are greater than 2 miles from the nearest named creek or river (question 7).

4. Dairy - Swine - Poultry Operation Details

A. Swine Operation

The largest proportion of operations studied were the Farrow-Finish type, 56.9% (question 1, Swine Operations). About 2/3 of the operations used Crate type farrowing (60.7%) while most of the remainder used Pens (32.4%, question 2).

B. Poultry Operations

40.3% of the poultry operations studied were layer-types. Though only

31.0% were broiler operations, these tended to be on a larger scale. A considerable amount, 16.1% had combinations of poultry, and one operator raised 19,000 cornish game hens (see Table 1).

C. Dairy Operations

The most common type of system for dairy operations was the stantion type, though other types were quite prevalent (question 1, Dairy Operation) 66.3% of the operations were more than 10 years old, but 1/3 of the operations were relatively new, indicating the diary industry is still growing (question 2). Most operations are using modern methods, but all seem to be fairly up-to-date (question 3 - 7).

D. Silage

Many Beef Operators, as well as Swine, Poultry, and Dairy Operators, answered the silage question. The pit-type seems to be very common (question 1, Silage), and contamination due to silage is considered to be negligible.

3. Ventilation and Manure Management

Most of the operations which responded to this section were dairy (39.0%) or swine feeder (19.6%), with a fairly even distribution of other types (question 1, Ventilation and Manure Management for enclosed operations). Several feedlot operators answered the section on solid manure. 32.7% of the operations stockpile manure (question 5) and only 6.4% of the stockpile locations slope towards a water course (question 6). Nevertheless, only 4.1% use abatement procedures (question 8), and one might conclude that a potential run-off problem exists in 2.3% of the cases studied. Though only 37.4% of the operations are presently using liquid manure (question 9), there seems to be a definite trend towards it because of more efficient handling techniques. Most of the liquid manure is untreated (question 14). Very few lagoons are used (question 15), and

94.6% of the operations indicated they used only the above mentioned methods of manure disposal.

6. Land Disposal of Manure

Judging by the high number of responses to the questions in this section, spreading manure on land (see questions on land disposal of manure) and plowing it in (question 9) is by far the most common manure disposal method. Most operators have relatively large amounts of land available for manure disposal (question 2) and consequently low rates of manure application (question 5). 40.4% of operators indicated that disposal areas are subject to run-off (question 11), and 57.1% said run-off went off the property (question 12). Thus, run-off is a potential problem for 40.0% of cases studied; 47.0% of operators spread manure onto snow.

7. Lagoon Detail

A low number of responses to this section indicates very little use of lagoons in the operations studied (lagoon detail questions). Most lagoons were naturally occuring (question 1), with clay bottoms (question 2) to control seepage. Only 50% of operators indicated that overflow stayed on their own property. The control of run-off waters from the confinement areas may be a problem.

8. Comments

Only 9.1% of operators interviewed had encountered complaints (question 1, comments section) and of these compaints, 70.6% referred to odor and 23.5% to run-off. Because of the low number of complaints, one might conclude there are no immediate problems; however, potential problems exist in the areas of odor and run-off

9. Farm Description Table I

The Farm Description Table consists of totals of turn-over, average number on hand, maximum capacity, estimated future capacity, and average time confined for each type of livestock operation. Many of the questionnaire tables were incompletely filled out; consequently, maximum capacity, future cpacity, and time confined appear to be low.

Projected increase based upon difference between present capacity and future capacity are more reliable than the numbers given in the table. For Swine operations (L. O. #'s 6, 7, and 8) the projected increase is only 8%. Beef operations (L. O. #'s 2, 3, 4, and 5) will increase in size by 26% over the next five years. Poultry operations (L. O. #'s 9, 10, and 11) show a 45% projected increase.

Conclusions

Actual occurrences of adverse environmental effects with respect to the livestock operations surveyed were minimal. Potential problems may exist in the areas of run-off and odor.

Beef operations appreared least well-equipped to deal with the problems of odor and run-off. While a considerable number of feedlots were subject to run-off, very few employed abatement techniques.

Most operators dispose of manure by spreading it on their own land. With encroachment of urban developments and increasing size of operations (see table 1), this method may eventually become inadequate. In addition, most operators spread manure on snow.

Complaints regarding the livestock operations surveyed were minimal, but most of these complaints were from urban developments and pertained to odor.

TABLE 1 FARM DESCRIPTION - TOTAL

Type of Operation	Turn-Over (Head/Year)	Average # On Hand	Maximum Capacity	Estimated Future Capacity (5 yrs.)	Time Confined (mos./year)
L.O.# 1 Dairy - Cows	10,835	13,577	15,334	15,003	9
L.O.# 2 Beef - Cows	18,737	19,222	23,721	24,396	6
L.O.# 3 Beef - Calves	5,625	6,544	7,705	7,794	7
L.O.# 4 Beef - Stockers (under 700 lb.)	33,657	15,646	18,422	26,209	8
L.O.# 5 Beef - Feeders (700 - 1000 lb.)	240,047	98,065	159,990	203,395	10
L.O.# 6 Swine - Sows	7,899	8,821	9,200	9,564	10
L.O.# 7 Swine - Wieners	58,390	20,619	24,648	26,033	11
L.O.# 8 Swine - Feeders (50 - 200 lb.)	168,806	77,497	97,770	106,435	12
L.O.# 9 Poultry - Layers	340,875	305,617	323,217	343,450	12
L.O.# 10 Poultry - Broilers	5,339,397	1,010,800	1,197,400	1,951,600	12
L.O.# 11 Poultry - Turkeys	472,160	213,360	222,860	228,260	12
L.O.# 12 Sheep	2,732	2,816	2,791	3,021	9
L.O.# 13 Others	0	25	25	25	12
Horses	--	28	6	--	--
Poultry Replacement Stock	--	1,800	31,000	31,000	12
Ducks	600	600	3,000	600	--
Geese	200	200	1,600	200	--
Cornish Game Hens	85,000	19,000	21,800	25,000	12
Registered Bulls	2	2	15	30	12

APPENDIX A:

Results of the Animal: Waste Disposal Survey Questionnaire

INTRODUCTORY QUESTIONS

100% Response Rate (est.)

2. Distance between nearest L.O. and Farm Residence:

(1)	Less than 100 ft.	5.1%
(2)	100 - 200 ft.	24.0%
(3)	200 - 500 ft.	51.3%
(4)	500 - 1200 ft.	14.1%
(5)	Greater than 1200 ft.	5.5%

(526 responses)

3. Distance between nearest neighbour and L. O.:

(1)	Less than 500 ft.	4.9%
(2)	500 ft. - 1/4 mi.	29.6%
(3)	1/4 mi. - 1/2 mi.	35.6%
(4)	1/2 mi. - 1 mi.	18.7%
(5)	Greater than 1 mile	11.2%

(534 responses)

4. Description of neighbours:

(1)	Farm Residence	81.0%
(2)	Country Residence	15.3%
(3)	Public Building	0.4%
(4)	Urban Development (City)	2.8%
(5)	Rural Sub-Division	0.4%
(6)	Other	0.7%

(531 responses)

7. Distance to nearest Town, Village or City Boundary:

(1)	Less than 1/4 mi.	3.7%
(2)	1/4 - 1 mi.	5.2%
(3)	1 - 3 mi.	16.5%
(4)	3 - 5 mi.	19.7%
(5)	Greater than 5 mi.	54.8%

(534 responses)

8. Distance of Residence Water Supply to nearest L. O.:

(1)	Less than 100 ft.	22.2%
(2)	100 - 500 ft.	48.4%
(3)	500 - 1000 ft.	12.7%
(4)	Greater than 1000 ft.	8.7%
(5)	Other	7.9%

(528 responses)

9. How are deadfall (dead Animals) disposed of ?

(1)	Shallow burial	14.2%
(2)	Proper sanitary landfill	3.0%
(3)	Burned in incinerator	7.9%
(4)	Rendering Services	57.0%
(5)	No particular method	17.8%

(533 responses)

WATER SOURCES FOR FARM

90% Response Rate (est.)

A. Surface Water

Domestic Purposes: 65% response rate (est.)
Livestock Purposes: 23% response rate (est.)

10. Which L.O. Numbers use Surface Water?

(see accompanying table, page 9)

		FREQ.			FREQ.
(1)	21.3%	53	(8)	4.0%	10
(2)	24.3%	60	(9)	3.2%	8
(3)	0.8%	2	(10)	2.0%	5
(4)	2.8%	7	(11)	0.4%	1
(5)	35.8%	89	(12)	0.4%	1
(6)	3.2%	8	(13)	0.0%	0
(7)	0.0%	0	(14)	2.0%	5 (combination of L.O.#'s)

(249 responses)

Note - for following question, 1st col. percentage applies to water source for domestic purposes, second col. for livestock operations.

11. Source of Surface Water:

(1)	Continous Flowing Creek or River or Spring	26.6%	23.8%
(2)	Intermittent Flowing Creek or River or Spring	63.4%	39.0%
(3)	Casual surface water or spring run-off	10.0%	37.2%
	# of responses	30*	223

13. Method of Diversion:

(1)	Dam	0.0%	5.2%
(2)	Dug-Out	88.9%	61.1%
(3)	Pump	3.7%	3.8%
(4)	None	7.4%	30.0%
	# of responses	27*	213

14. Total Storage Capacity of Dams or Dugouts:

(1)	Under 50,000 cu. ft.	8.0%	24.6%
(2)	50,000 - 100,000 cu. ft.	20.0%	22.5%
(3)	100,000 - 200,000 cu. ft.	40.0%	21.6%
(4)	over 200,000 cu. ft.	36.0%	31.7%
	# of responses	25*	142

15. Are Dams or Dugouts Licenced?

(1)	Yes	4.2%	25.9%
(2)	No	95.8%	87.2%
	# of responses	25*	141

16. Method of Water Delivery:

(1)	Free access	0.0%	54.8%
(2)	Pressure System	79.6%	34.2%
(3)	Transported from Source	14.3%	5.5%
(4)	Other	7.1%	5.5%
	# of responses	28*	219

17. When is Surface Water Used?

(1)	Summer (May - October)	0.0%	51.4%
(2)	Winter (snow or frost)	88.9%	76.5%
(3)	Both	92.9%	46.3%
	# of responses	28*	220

18. How is Surface Water used in Winter?

(1)	Free Access through ice	0.0%	11.8%
(2)	Pressure System	88.9%	76.5%
(3)	Transported	7.4%	2.9%
(4)	Other	3.7%	8.8%
	# of responses	28*	220

19. Ever been a water shortage?

(1)	Yes	3.6%	19.0%
(2)	No	96.4%	81.0%
	# of responses	28*	211

B. Groundwater
Domestic: 85% response rate (est.)
Livestock: 54% response rate (est.)

20. Which L.O. Numbers use Groundwater?

		FREQ.			FREQ.	
(1)	26.8%	157	(8)	12.0%	70	
(2)	10.9%	64	(9)	4.3%	25	
(3)	0.7%	4	(10)	2.9%	17	
(4)	2.9%	17	(11)	1.0%	6	
(5)	25.5%	149	(12)	0.0%	0	
(6)	8.0%	47	(13)	0.2%	1	
(7)	0.8%	5	(14)	3.9%	23	(combination of L.O. #'s)

(585 responses)

41. Depth of Well:

(1)	Under 20 ft.	3.3%	3.3%
(2)	20 - 80 ft.	22.5%	21.4%
(3)	80 - 150 ft.	39.0%	40.6%
(4)	150 - 200 ft.	18.0%	18.3%

(5)	over 200 ft.	18.4%	16.7%
	# of responses	451	569

42. Is Well Screened?

(1)	Yes	29.6%	28.9%
(2)	No	59.2%	60.4%
(3)	Do not know	11.2%	10.6%
	# of responses	446	557

43. Does Well have slotted casing?

(1)	Yes	35.7%	33.2%
(2)	No	48.6%	49.4%
(3)	Do not know	15.7%	17.7%
	# of responses	440	549

44. Is Well an open hole?

(1)	Yes	25.9%	29.2%
(2)	No	70.7%	66.8%
(3)	Do not know	3.4%	4.0%
	# of responses	437	452

45. Has Water Analysis Ever Been Made?

(1)	Yes	77.5%	68.4%
(2)	No	20.9%	29.1%
(3)	Do not know	15.6%	2.5%
	# of reponses	449	561

46. Well Capacity:

(1)	Less than 2 g.p.m.	6.0%	3.4%
(2)	2 - 5 g.p.m.	26.8%	19.4%
(3)	5 - 10 g.p.m.	25.9%	29.6%
(4)	10 - 20 g.p.m.	18.3%	23.2%
(5)	Over 20 g.p.m.	22.8%	24.4%
	# of responses	447	551

47. Ever had a Water Shortage ?

(1)	Yes	21.9%	16.3%
(2)	No	77.5%	84.5%
(3)	Do not know	0.6%	0.2%
	# of responses	351	565

48. Distance from well to nearest L.O.:

(1)	under 20 ft.	13.1%	40.8%
(2)	20 - 100 ft.	15.6%	25.8%
(3)	100 - 300 ft.	40.4%	22.2%
(4)	over 300 ft.	30.9%	11.2%
	# of responses	456	562

49. Method of Water Delivery:

(1)	Flowing	0.0%	0.9%
(2)	Manual	0.2%	0.9%
(3)	Pressure System	47.8%	86.2%
(4)	Pump	7.0%	12.0%

(5)	Transportation from source	0.0%	0.0%
(6)	Other	0.0%	0.0%
	# of responses	456	562

70. When is Groundwater used?

(1)	Summer (May - October)	0.2%	1.2%
(2)	Winter (snow or frost)	0.4%	8.6%
(3)	Both	99.4%	95.2%
	# of responses	447	563

73. Are there other sources of water?

(1)	Yes	19.9%
(2)	No	80.1%
	# of responses	472

BEEF OPERATIONS

A. COW CALF
20% response rate (est.)

1. Are Animals Ever Confined?

(1)	Yes	68.7%
(2)	No	31.3%

(163 responses)

2. Time Confined (Months):

(1)	Les than 3 mos.	22.0%
(2)	3 - 6 mos.	41.3%
(3)	6 - 12 mos.	36.7%

(109 responses)

3. Type of Confinement if Applicable :

(1)	Feedlot - refers to confinement in a corral system	28.6%
(2)	Pasture - applies to small pasture situation with fixed feeding, bedding and water locations	69.7%
(3)	Other	3.7%

(112 responses)

B. FEEDLOT SYSTEM
49% response rate (est.)

1. Area / Animal (sq. ft.)

(1)	Less than 100 sq. ft.	3.9%
(2)	100 - 200 sq. ft.	15.8%
(3)	200 - 400 sq. ft.	44.1%
(4)	400 - 600 sq. ft.	20.0%
(5)	Greater than 600 sq. ft.	16.2%

(260 responses)

2. Type of Feedlot :

(1)	Open dirt lot	96.2%
(2)	Paved open lot	2.7%
(3)	Modified environment closed lot	0
(4)	Controlled environment closed lot	0
(5)	Other	1.1%

(261 responses)

3. Length of Time Feedlot is in Operation During Year:

(1)	Less than 3 mos.	0
(2)	3 - 6 mos.	13.2%
(3)	6 - 12 mos.	86.8%

(257 responses)

INFORMATION ON FEEDLOT OR CONFINEMENT AREA
Cow-Calf: 23% response rate (est.)
Feedlot: 47% respo se rate (est.)

1.

Amount of Bedding Used Per Year:	Cow-Calf Operation	Feedlot Operation
(1) Less than 2 tons	3.4	0.8
(2) 2 - 5 tons	3.4	0.8
(3) 5 - 15 tons	16.9	17.0
(4) 15 - 50 tons	28.8	21.9
(5) Greater than 50 tons	47.5	69.5
	(188 responses)	(256 responses)

2.

Slope of Lot or Confinement Location:	Cow-Calf Operation	Feedlot Operation
(1) Flat	25.4%	18.7%
(2) Slight Slope 0-2%	39.3%	48.2%
(3) Well Sloped 2-6%	27.0%	31.5%
(4) Steep or Irregular	8.2%	1.6%
	(122 responses)	(251 responses)

3. Sub-Soil Type:

(1)	Clay	55.4%	50.2%
(2)	Clay Loams	24.8%	29.2%
(3)	Loams & Sandy Loams	18.2%	17.4%
(4)	Sand & Gravel	1.6%	3.2%

(5)	Bed Rock	0	0
		(121 responses)	(253 responses)

4. Where does Run-off go ?

(1)	Slough or flat on own farm	65.5%	60.3%
(2)	Slough or water course with intermittent drainage off farm	24.1%	26.1%
(3)	Slough or watercourse with continuous drainage off farm	6.9%	11.2%
(4)	Other	3.4%	2.4%
		(116 responses)	(249 responses)

5. Abatement Procedures if any:

(1)	Diversion of surface water	25.0%	31.4%
(2)	Run-off collection channels	25.0%	22.8%
(3)	Settling basins	0.0%	2.9%
(4)	Detention pond or lagoon	12.0%	20.0%
(5)	Other	37.5%	22.8%
		(8 responses)	(35 responses)

6.

Size of Detention Pond if Applicable (cu. ft.):		Cow-Calf Operation	Feedlot Operation
(1)	Less than 5,000 cu. ft.	0	0
(2)	5,000 - 30,000 cu. ft.	0	33.3
(3)	30,000 - 100,000 cu. ft.	0	33.3
(4)	Greater than 100,000 cu. ft.	0	33.3
	Responses	0	6

7. Distance of Feedlot or Confinement Area From Nearest Named Creek or River:

(1)	Less than 300 ft.	4.4	4.0
(2)	300 ft. - 1/4 mi.	6.1	9.3
(3)	1/4 - 1/2 mi.	6.1	6.1
(4)	1/2 - 2 mi.	28.1	22.3
(5)	Greater than 2 mi.	55.3	58.3
	Responses	114	247

DAIRY - SWINE - POULTRY OPERATION DETAILS

Swine Operation

28% response rate (247)

1. Type of Operation :

			FREQ.
(1)	Farrow - Weiner	11.3%	17
(2)	Feeder	31.8%	48
(3)	Farrow - Finish	56.9%	86
(4)	Other	0	0
	Responses	151	

2. Farrowing Method if Applicable :

(1)	Pen	32.4%
(2)	Crate	60.7%
(3)	Other	6.9%
	Responses	102

Poultry Operation

16% response rate (est.)

1. Type of Operation:

			FREQ.
(1)	Layers	40.3%	35
(2)	Broilers	31.0%	27
(3)	Turkeys	11.5%	10
(4)	Combination of Above	16.1%	14
(5)	Other	1.1%	1
	Responses	87	

Dairy Operations

32% response rate (est.)

1. Type of System:

(1)	Stantion	39.7%
(2)	Free stall Warm	13.4%
(3)	Free Stall Cold	17.9%
(4)	Loose Housing	28.5%
(5)	Other	0.6%
	Responses	179

2. Time in Present Operation (yrs):

(1)	Less than 5 yrs.	18.0%
(2)	5 - 10 yrs.	15.7%
(3)	More than 10 yrs.	66.3%
	Responses	178

3. Manner in which Milkhouse and Milk Parlor Wastes are disposed of:

(1)	Septic tank and Field	25.0%
(2)	Septic tank open discharge	20.5%
(3)	Liguid Manure System	18.7%
(4)	Open Discharge	18.7%
(5)	Other	17.1%
	Responses	176

4. What is Bulk Tank Size (gal,)? Note - 10 lb/gal.

(1)	300 - 600 gal.	54.6%
(2)	600 - 1,000 gal.	24.8%
(3)	1,000 - 1,500 gal.	7.7%
(4)	DO NOT HAVE ONE	12.9%
	Responses	170

5. Does System have an Automatic Clean ?

(1)	Yes	51.1%
(2)	No	42.9%
	Responses	168

6. Is there a Milk Pipeline Around Barn System ?

(1)	Yes	57.1%
(2)	No	42.9%
	Responses	168

7. Is there a Milking Parlor ?

(1)	Yes	60.4%
(2)	No	39.6%
	Responses	169

Silage

1. If Silage is Used, What Type of Silo is There ?

(1)	Pit	69.6%
(2)	Bunker	13.4%
(3)	Upright	11.7
(4)	Other	5.3%
	Responses	171

2. Could Silo Potentially Contaminate a Farm ?

(1)	Yes	1.7%
(2)	No	98.3%
	Responses	171

3. Could Silo Potentially be Contaminated by Run-off ?

(1)	Yes	4.1%
(2)	No	95.9%
	Responses	171

VENTILATION AND MANURE MANAGEMENT FOR ENCLOSED OPERATIONS

28% response rate (est.)

1. Enclosed Operations - One for	%	No.
(1) Dairy	39.0%	175
(2) Swine (Farrow - Weiner)	9.1%	41
(3) Swine (Feeder)	19.6%	88
(4) Swine (Farrow - Finish)	11.1%	50
(5) Poultry - Layers	8.7%	39
(6) Poultry - Broiler	6.9%	31
(7) Poultry - Turkeys	2.8%	12
(8) Poultry - Combinations or Other	2.9%	13
Responses		449

2. Type of Ventilating System :

(1) Gravity	25.8%
(2) Mechanical	67.9%
(3) Both	4.5%
(4) Other	0.4%
(5) None	1.4%
Responses	442

3. Type of Ventilation Outlet :

(1) Wall	73.0%
(2) Roof	9.8%
(3) Both	11.4%
(4) Other	5.7%
Responses	437

MANURE MANAGEMENT

4. Is solid manure used :

(1)	Yes	72.7
(2)	No	27.3
	Responses	422

5. How is it Hauled?

(1)	Hauled daily	32.1%
(2)	Hauled periodically	34.6%
(3)	Stockpiled (hauled periodically)	19.6%
(4)	Stockpiled (hauled annually)	13.1%
(5)	Other	0.6%
	Responses	321

6. Description of Stockpile Location?

(1)	Level	43.0%
(2)	Slope undetermined	22.7%
(3)	Undulating terrain and no definite major run-off	19.2%
(4)	Sloped to watercourse	6.4%
(5)	Other	8.7%
	Responses	172

7. Amount of Bedding Used Per Year ?

(1)	Less than 2 tons	9.9%
(2)	2 - 5 Tons	6.4%
(3)	5 - 15 Tons	15.5%
(4)	15 - 50 Tons	33.9%

(5)	More than 50 Tons	34.3%
	Responses	283

8. Type of Abatement if Stockpiled :

(1)	Diverts surface water	1.2%
(2)	Collects run-off	2.9%
(3)	None	95.9%
	Responses	173

9. Is Liquid Manure Used?

(1)	Yes	37.4%
(2)	No	62.6%
	Responses	404

10. Type of System Used:

(1)	Partially slatted floor	56.4%
(2)	Deep narrow gutter	13.9%
(3)	Fully slatted	4.6%
(4)	Solid Floor	21.8%
(5)	Other	3.3%
	Responses	151

11. Type of Storage:

(1)	Open Pit	8.8%
(2)	Covered storage	34.4%
(3)	Under slats	47.3%
(4)	Other	9.5%
	Responses	148

12. Length of Storage Time (weeks):

(1)	Less than 2 wks.	35.6%
(2)	2 - 6 wks.	44.6%
(3)	6 - 8 wks.	7.0%
(4)	8 - 12 wks.	4.5%
(5)	More than 12 wks.	8.3%
	Responses	157

13. Amount of Bedding Used Per Year:

(1)	Less than 2 Tons	83.3%
(2)	2 - 5 Tons	8.3%
(3)	5 - 15 Tons	4.6%
(4)	15-50 Tons	1.9%
(5)	More than 50 Tons	1.9%
	Responses	108

14. Type of Treatment Used on Manure:

(1)	Manure additives (enzymes)	15.0%
(2)	Oxidation	1.3%
(3)	None	83.7%
	Responses	147

15. Is a Lagoon Used?

			FREQ.
(1)	Yes	9.5%	18
(2)	No	90.5%	171
	Responses	189	

16. Any Other Manure Management Disposal System Used :

			FREQ.
(1)	Dehydration	0 %	0
(2)	Deep pit	2.7%	7
(3)	Other	2.7%	7
(4)	None	94.6%	245
	Responses	259	

Land Disposal of Manure

1. Amount of Land Farmed, i.e., owned and/or Leased (acres):

(1)	under 20 ac.	2.5%
(2)	20 - 40 ac.	3.6%
(3)	80 - 160 ac.	7.6%
(4)	160 - 640 ac.	33.1%
(5)	Over 640 ac.	53.2%
	# of responses	526

2. Total Amount of land available on which to dispose of Manure:

(1)	Under 20 ac.	4.7%
(2)	20 - 40 ac.	4.7%
(3)	80 - 160 ac.	9.6%
(4)	160 - 640 ac.	42.4%
(5)	Over 640 ac.	43.6%
	# of responses	521

3. Is land available

(1)	Irrigated ?	6.8%
(2)	Dryland?	86.7%
(3)	Both?	6.5%
	# of responses	526

4. Maximum Distance manure must be hauled (miles):

(1)	Under 1/4 mi.	5.7%
(2)	1/4 - 1 mi.	61.4%
(3)	1 - 2 mi.	21.8%
(4)	2 - 5 mi.	9.6%
(5)	Over 5 mi.	1.5%
	# of responses	524

5. Rate of Manure Application (tons/acre):

(1)	under 10 T/ac.	23.0%
(2)	10 - 40 T/ac.	60.3%
(3)	40 - 70 T/ac.	2.9%
(4)	over 70 T/acre	1.3%
(5)	unable to obtain or calculate	12.5%
	# of responses	522

6. How often is Manure applied to any particular piece of land?

(1)	continuously	21.4%
(2)	Once in 2 years	15.3%
(3)	One in 3 years	22.2%
(4)	over 1 in 3 years	13.4%
(5)	no particular planned rotation program	26.7%
	# of responses	517

7. Who Spreads Manure ?

(1)	Owner	74.0%
(2)	Custom	16.7%
(3)	Both	9.3%
	# of respones	515

8. What Method of Spreading is Used?

(1)	Tractor & Spreader	49.3%
(2)	Tractor & Tank	13.7%
(3)	Truck	27.8%
(4)	Irrigation	0.4%
(5)	Other	8.8%
	# of responses	509

9. Method of incorporating Manure into soil:

(1)	Cultivation by plow or disc	90.5%
(2)	Injections	0.4%
(3)	No particular method	5.1%
(4)	Other	0.6%
(5)	None	3.4%
	# of responses	526

10. When is Manure Spread on Land?

(1)	All year	41.8%
(2)	Summer (includes late spring & early fall)	53.0%
(3)	Winter (snow)	5.2%
	# of responses	521

11. Are Disposal areas subject to run-off?

(1)	Yes	40.4%
(2)	No	54.8%
(3)	Do not know	4.8%
	# of responses	513

12. Where does run-off from Disposal areas go?

(1)	To undrained slough or flat on own farm	42.9%
(2)	To undrained slough or flat near farm	16.5%
(3)	To slough or depression which has drainage when full	17.9%
(4)	To slough or flat not on farm which overflows	3.3%
(5)	To creek, ditch, watercourse or other surface water off farm	19.3%
	# of responses	218

LAGOON DETAIL
44% responses rate (est.)

1. Type of Lagoon:

(1)	Natural	87.5%
(2)	Constructed	12.5%
(3)	Both	0.0%
	# of responses	24

2. Seepage Control:

(1)	Constructed lining	4.5%
(2)	Assurance of clay bottom	77.3%
(3)	None	18.2%
	# of responses	22

3. Where Does Overflow Go ?

(1)	Slough or flat on own farm	50.0%
(2)	Slough or watercourse with intermittent drainage off farm	10.0%
(3)	Slough or watercourse with continuous drainage off farm	10.0%
(4)	Other	30.0%
	# of responses	20

4. How is/or will Lagoon be emptied?

(1)	Drain	4.5%
(2)	Overflow	18.2%
(3)	Pump	36.4%
(4)	Irrigation	27.3%
(5)	Solid manure methods	13.6%
	# of responses	22

5. Surface Area of Lagoons (sq. ft.):

(1)	under 2,000 sq.ft.	4.0%
(2)	2,000 - 5,000 sq.ft.	16.0%
(3)	5,000 - 10,000 sq.ft.	28.0%
(4)	10,000 - 50,000 sq.ft.	40.0%
(5)	over 50,000 sq.ft.	12.0%
	# of responses	25

6. Average depth of Lagoons (ft.):

(1)	under 3 ft.	4.0%
(2)	3 - 5 ft.	8.0%
(3)	5 - 10 ft.	44.0%
(4)	10 - 15 ft.	32.0%
(5)	over 15 ft.	12.0%
	# of responses	25

7. Approximate Capacity of Lagoons (cu.ft.):

(1)	Under 10,000 cu.ft.	8.0%
(2)	10,000 - 20,000 cu.ft.	8.0%
(3)	20,000 - 100,000 cu.ft.	40.0%
(4)	100,000 - 500,000 cu.ft.	32.0%
(5)	over 500,000 cu.ft.	12.0%
	# of responses	25

8. Time Required to fill Empty Lagoons (mos.):

(1)	under 6 mos.	8.7%
(2)	6 - 12 mos.	39.1%
(3)	12 -24 mos.	8.7%
(4)	over 24 mos.	26.1%
(5)	Do not know	17.4%
	# of responses	23

COMMENTS

95% response rate (est.)

1. Has Farmer ever encountered any complaints related to manure management?

(1)	Yes	9.1%
(2)	No	90.9%
	# of responses	504

2. If so, from whom?

(1)	Neighbouring farm residence	26.5%
(2)	Neighbouring country residence	20.6%
(3)	Public Facility	8.8%
(4)	Industrial facility	0.0%
(5)	Neighbouring town or city residents	29.4%
(6)	Other	14.7%
	# of responses	34

3. What was alleged nature of complaint?

(1)	Odor	70.6%
(2)	Flies	2.9%
(3)	Run-off	23.5%
(4)	Other	2.9%
	# of responses	34

APPENDIX B:

Sample of the Animal Waste Disposal Survey Questionnaire

CODE: | | | | | | | | |

ANIMAL WASTE DISPOSAL SURVEY

LOCATION

OWNER _____ ADDRESS _____

MANAGER _____ ADDRESS _____

1. Legal Description of Farmstead (1/4, section, township, range) meridian

9 10 | 11 12 | 13 14 | 15 16 | 17

2. Distance between nearest L.O. and Farm Residence — 18

(1) Less than 100 ft. (2) 100 - 200 ft. (3) 200 - 500 ft.

(4) 500 - 1200 ft. (5) Greater than 1200 ft.

3. Distance between nearest neighbour and L.O. — 19

(1) Less than 500 ft. (2) 500 ft. - 1/4 mi. (3) 1/4 mi.-1/2 mi.

(4) 1/2 mi. - 1 mi. (5) Greater than 1 mile

4. Direction to nearest neighbour — 20

(1) North (2) South (3) East

(4) West (5) North-East (6) North-West

(7) South-East (8) South-West

5. Description of neighbours — 21

(1) Farm Residence (2) Country Residence

(3) Public Building (4) Urban Development (City)

(5) Rural Sub-division (6) Other

6. Direction of Prevailing Wind — 22

(1) North-West (2) South-West

(3) West (4) South

(5) North (6) Other

7. Distance to nearest Town, Village or City Boundary

23 ☐

(1) Less than 1/4 mi. (2) 1/4 - 1 mi. (3) 1 - 3 mi.

(4) 3 - 5 mi. (5) Greater than 5 mi.

8. Distance of Residence Water Supply to nearest L.O.

24 ☐

(1) Less than 100 ft. (2) 100 - 500 ft.

(3) 500 - 1000 ft. (4) Greater than 1000 ft. (5) Other

9. How are deadfall (Dead Animals) disposed of

25 ☐

(1) Shallow burial (2) Proper sanitary landfill

(3) Burned in incinerator (4) Rendering Services

(5) No particular method

WATER SOURCES FOR FARM

26 ☐

0. Is SURFACE water a major source for a confined operation

(1) YES (2) NO

NOTE: IF NO, SKIP QUESTIONS ON SURFACE WATER

WHICH L.O. NUMBERS USE SURFACE WATER
NOTE: COMBINATION OF L.O.'S IS #14

28 29 30 31

DOMESTIC PURPOSES ☐☐ ☐☐

Is Surface Water Used For

(1) YES (2) NO

36 37 38

11. ☐ 21. ☐ 31. ☐

Source of Surface Water

(1) Continuous flowing creek of river or spring

(2) Intermittent flowing creek or river or spring

(3) Casual surface water or spring run-off

42 43 44

12. ☐ 22. ☐ 32. ☐

Method of Diversion

(1) Dam (2) Dug-out

(3) Pump (4) None

13. 48 [ ] 23. 49 [ ] 33. 50 [ ]

If Dams or Dugouts, what Total Storage Capacity or Size

(1) Less than 50,000 cu.ft. (2) 50,000-100,000 cu.ft.

(3) 100,000 - 200,000 cu.ft. (4) Greater than 200,000cu.ft

14. 54 [ ] 24. 55 [ ] 34. 56 [ ]

Are Dams or Dugouts Licensed

(1) YES (2) NO

15. 60 [ ] 25. 61 [ ] 35. 62 [ ]

Method of Water Delivery

(1) Free access (2) Pressure System

(3) Transported from Source (4) Other

16. 66 [ ] 26. 67 [ ] 36. 68 [ ]

When is Surface Water Source Used

(1) Summer (May-October) (2) Winter (snow or frost)

(3) Both

17. 72 [ ] 27. 73 [ ] 37. 74 [ ]

How is Surface Water Used in Winter

(1) Free access through ice (2) Pressure System

(3) Transported (4) Other

18. 78 [ ] 28. 79 [ ] 38. 80 [ ]

Has there ever been a Water Shortage

(1) YES (2) NO

19. 12 [ ] 29. 13 [ ] 39. 14 [ ]

0. Is Groundwater a major Source

(1) YES (2) NO

27 [ ]

WHICH L.O. NUMBERS USE GROUNDWATER

DOMESTIC PURPOSES 32 33 34 35

Is Groundwater Used For

(1) YES (2) NO

39 40 41

40 50 60

Depth of Well

(1) Less than 20 ft. (2) 20 - 80 ft. (3) 80 - 150 ft.

(4) 150 - 200 ft. (5) Greater than 200 ft.

45 46 47

41 51 61

Is Well Screened

(1) YES (2) NO (3) DO NOT KNOW

51 52 53

42 52 62

Does Well have Slotted Casing

(1) YES (2) NO (3) DO NOT KNOW

57 58 59

43 53 63

Is Well an Open Hole

(1) YES (2) NO (3) DO NOT KNOW

63 64 65

44 54 64

Has a Water Analysis ever been made

(1) YES (2) NO (3) DO NOT KNOW

69 70 71

45 55 65

Well Capacity

(1) Less than 2 g.p.m. (2) 2 - 5 g.p.m. (3) 5-10 -.p.m.

(4) 10 - 20 g.p.m. (5) Greater than 20 g.p.m.

75 76 77

46 56 66

Ever had Water Shortage

(1) YES (2) NO (3) DO NOT KNOW

9 10 11

47 57 67

Distance from Well to Nearest L.O.

(1) Less than 20 ft. (2) 20 - 100 ft.

(3) 100 - 300 ft. (4) Greater than 300 ft.

15 16 17

48 58 68

Method of Water Delivery

(1) Flowing (2) Manual

(3) Pressure System (4) Pump

(5) Transportation of Source (6) Other

19 20 21

49 [ ] 59 [ ] 69 [ ]

When is Groundwater Source Used

(1) Summer (May-October) (2) Winter (snow or frost)

(3) Both

22 23 24

70 [ ] 71 [ ] 72 [ ]

73. Are there other Sources of Water

(1) YES (2) NO

NOTE: STATE WHAT KIND ON COMMENT SHEET

18 [ ]

FARM DESCRIPTION (NUMBER OF LIVESTOCK)

TYPE OF OPERATION	TURN OVER (head/yr.) 25–29	AVERAGE # on hand 30–34	MAXIMUM CAPACITY (head) 35–39	ESTIMATED FUTURE CAPACITY (5 yrs.) 40–44	TIME CONFINED (mos./yr.) 45–46
L.O.#1 DAIRY - COWS					
L.O.#2 BEEF - COWS	47–51	52–56	57–61	62–66	67–68
L.O.#3 BEEF-CALVES	69–73	74–78	NEW CARD 03 / 9–13	14–18	19–20
L.O.#4 BEEF STOCKER (less than 700 lbs.)	21–25	26–30	31–35	36–40	41–42
L.O.#5 BEEF FEEDERS (700-1000lb)	43–47	48–52	53–57	58–62	63–64
L.O.#6 SWINE SOWS	65–69	70–74	75–79 / 04	9–13	14–15
L.O.#7 SWINE WEINERS	16–20	21–25	26–30	31–35	36–37
L.O.#8 SWINE-FEEDER (50-200 lb.)	38–42	43–47	48–52	53–57	58–59
L.O.#9 POULTRY LAYERS	60–64	65–69	70–74	75–79	NEW CARD 05 / 9–10
L.O.#10 POULTRY BROILERS	11–15	16–20	21–25	26–30	31–32
L.O.#11 POULTRY TURKEYS	33–37	38–42	43–47	48–52	53–54
L.O.#12 SHEEP	55–59	60–64	65–69	70–74	75–76
L.O.#13 OTHER 06	9–13	14–18	19–23	24–28	29–30

BEEF OPERATIONS

A. COW-CALF 31

(1) YES (2) NO

1. Are Animals Ever Confined 32

(1) YES (2) NO

NOTE: CONFINEMENT IN THIS CASE REFERS TO COW MANAGEMENT OTHER THAN RANGE CONDITIONS (E.G. WINTER FEEDING PERIOD)

2. Time Confined (Months) 33

(1) Less than 3 mos. (2) 3 - 6 mos.

(3) 6 - 12 mos.

3. Type of Confinement if Applicable 34

(1) Feedlot - refers to confinement in a corral system

(2) Pasture - applies to small pasture situation with fixed feeding, bedding and water locations

(3) Other

B. FEEDLOT SYSTEM 35

(1) YES (2) NO

1. Area/Animal (sq.ft.) 36

(1) Less than 100 sq.ft. (2) 100-200 sq.ft. (3) 200-400 sq.ft.

(4) 400-600 sq.ft. (5) Greater than 600 sq.ft.

2. Type of Feedlot 37

(1) Open dirt lot (2) Paved open lot

(3) Modified environment closed lot

(4) Controlled environment closed lot

(5) Other

38

3. Length of Time Feedlot Is In Operation During Year

(1) Less than 3 mos. (2) 3 - 6 mos. (3) 6 - 12 mos.

INFORMATION ON FEEDLOT OR CONFINEMENT AREA

	Cow-Calf Operation	Feedlot Operation
1. Amount of Bedding Used Per Year	39	40
(1) Less than 2 Tons (2) 2 - 5 Tons (3) 5 - 15 Tons		
(4) 15 - 50 Tons (5) Greater than 50 Tons		
2. Slope of Lot or Confinement Location	41	42
(1) Flat (2) Slight Slope 0 - 2%		
(3) Well Sloped 2-6% (4) Steep or Irregular		
3. Sub-Soil Type	43	44
(1) Clay (2) Clay Loams		
(3) Loams & Sandy Loams (4) Sand & Gravel		
(5) Bed Rock		
4. Where does Run-off go	45	46
(1) Slough or flat on own farm		
(2) Slough or watercourse with intermittent drainage off farm		
(3) Slough or watercourse with continuous drainage off farm		
(4) Other		
5. Abatement Procedures if any	47	48
(1) Diversion of surface water		
(2) Run-off collection channels		
(3) Settling Basins		
(4) Detention pond or lagoon		
(5) Other		

6. Size of Detention Pond if Applicable (cu.ft.) 49 50

(1) Less than 5,000 cu.ft. (2) 5,000-30,000 cu.ft.

(3) 30,000-100,000 cu.ft. (4) Greater than 100,000 cu.ft.

7. Distance Feedlot or Confinement Area is From Nearest Named Creek or River 51 52

(1) Less than 300 ft. (2) 300ft.-1/4 mi. (3) 1/4 - 1/2 mi.

(4) 1/2 - 2 mi. (5) Greater than 2 mi.

DAIRY - SWINE - POULTRY OPERATION DETAILS

SWINE OPERATIONS

1. Type of Operation 53

(1) Farrow - Weiner (2) Feeder

(3) Farrow - Finish (4) Other

2. Farrowing Method if Applicable 54

(1) Pen (2) Crate (3) Other

POULTRY OPERATIONS

1. Type of Operation 55

(1) Layers (2) Broilers (3) Turkeys

(4) Combination of Above (5) Other

DAIRY OPERATIONS

1. Type of System 56

(1) Stantion (2) Free Stall Warm

(3) Free Stall Cold (4) Loose Housing

(5) Other

2. Time in Present Operation (yrs.) 57

(1) Less than 5 yrs. (2) 5-10 yrs.

(3) More than 10 yrs.

3. Manner in which Milkhouse and Milk Parlor Wastes are disposed of

(1) Septic tank and field

(2) Septic tank open discharge 58

(3) Liquid manure system

(4) Open discharge

(5) Other

4. What is Bulk Tank Size (gal.) 59

(1) 300 - 600 gal. (2) 600 - 1,000 gal.

(3) 1,000 - 1,500 gal. (4) DO NOT HAVE ONE

NOTE: 10 lb./gal.

5. Does System have an Automatic Clean 60

(1) YES (2) NO

6. Is there a Milk Pipeline Around Barn System 61

(1) YES (2) NO

7. Is there a Milking Parlor 62

(1) YES (2) NO

SILAGE

1. If Silage is Used, What Type of Silo is There 63

(1) Pit (2) Bunker (3) Upright (4) Other

2. Could Silo Potentially Contaminate a Farm 64

(1) YES (2) NO

3. Could Silo Potentially be Contaminated by Run-off

65 [ ]

(1) YES (2) NO

VENTILATION AND MANURE MANAGEMENT FOR ENCLOSED OPERATIONS

VENTILATION

1. Enclosed Operations - One for

(1) Dairy (2) Swine (Farrow-Weiner)

(3) Swine (Feeder) (4) Swine (Farrow-Finish)

(5) Poultry- Layers (6) Poultry - Broiler

(7) Poultry-Turkeys (8) Poultry - Combination or Other

66 67 68 [ ] [ ] [ ]

2. Type of Ventilating System

(1) Gravity (2) Mechanical

(3) Both (4) Other (5) None

69 70 71 [ ] [ ] [ ]

3. Type of Ventilation Outlet

(1) Wall (2) Roof

(3) Both (4) Other

72 73 74 [ ] [ ] [ ]

MANURE MANAGEMENT

4. Is solid manure used

75 76 77 [ ] [ ] [ ]

(1) YES (2) NO

NOTE: IF NO, SKIP QUESTIONS 5 - 8

5. How is it Hauled

(1) Hauled daily (2) Hauled periodically

(3) Stockpiled (hauled periodically)

(4) Stockpiled (hauled annually)

(5) Other

78 79 80 [ ] [ ] [ ]

NOTE: IF OTHER THAN (3) SKIP QUESTION 3

6. Description of Stockpile Location

(1) Level (2) Slope undetermined

(3) Undulating terrain and no definite major run-off

(4) Sloped to watercourse

(5) Other

9 10 11

7. Amount of Bedding Used Per Year

(1) Less than 2 Tons (2) 2 - 5 Tons (3) 5 - 15 Tons

(4) 15 - 50 Tons (5) More than 50 Tons

12 13 14

8. Type of Abatement if Stockpiled

(1) Diverts surface water

(2) Collects run-off

(3) None

15 16 17

9. Is Liquid Manure Used

(1) YES (2) NO

NOTE: IF NO, SKIP QUESTIONS 10 - 14

18 19 20

10. Type of System Used

(1) Partially slatted floor

(2) Deep narrow gutter

(3) Fully slatted

(4) Solid floor

(5) Other

21 22 23

11. Type of Storage

(1) Open pit (2) Covered storage

(3) Under Slats (4) Other

24 25 26

12. Length of Storage Time (weeks)

27 28 29

(1) Less than 2 wks. (2) 2-6 wks. (3) 6-8 wks.

(4) 8 - 12 wks. (5) More than 12 wks.

13. Amount of Bedding Used Per Year

30 31 32

(1) Less than 2 Tons (2) 2 -5 Tons (3) 5-15 Tons

(4) 15 - 50 Tons (5) More than 50 Tons

14. Type of Treatment Used on Manure

33 34 35

(1) Manure additives (enzymes) (2) Oxidation

(3) None

15. Is a Lagoon Used

36 37 38

(1) YES (2) NO

NOTE: IF YES, SEE LAGOON QUESTIONNAIRE

16. Is Any Other Manure Management Disposal System Used

39 40 41

(1) Dehydration (2) Deep pit

(3) Other (4) None

LAND DISPOSAL OF MANURE

1. Amount of Land Farmed, ie Owned and/or Leased (Acres)

42

(1) Less than 20 ac. (2) 20-40 ac. (3) 80-160 ac.

(4) 160 - 640 ac. (5) More than 640 ac.

2. Total Amount of Land Available on Which to Dispose of Manure

43

(1) Less than 20 ac. (2) 20-40 ac. (3) 80-160 ac.

(4) 160 - 640 ac. (5) More than 640 ac.

3. Is Land Available

44

(1) Irrigated (2) Dryland (3) Both

4. Maximum Distance That Manure Has to be Hauled (miles)

45

(1) Less than 1/4 mi. (2) 1/4 - 1 mi. (3) 1 - 2 mi.

(4) 2 - 5 mi. (5) More than 5 mi.

5. Rate of Manure Application (tons/acre)

NOTE: 1 Ton = 200 gals. liquid manure
1 cu.yd. = approx. 500 lb. solid manure
4 cu.yd. = approx. 1 Ton solid manure
1 Bus. = approx. 30 lbs. solid manure

46

(1) Less than 10 T/ac. (2) 10 - 40 T/ac. (3) 40-70 T/ac.

(4) More than 70 T/ac. (5) Unable to obtain or calculate

6. How Often is Manure Applied to Any Particular Piece of Land

47

(1) Continuously (2) Once in 2 yrs. (3) 1 in 3 yrs.

(4) More than 1 in 3 yrs. (5) No particular planned rotation program

7. Who Spreads Manure

48

(1) Owner (2) Custom (3) Both

8. What Method of Spreading is Used

49

(1) Tractor & spreader (2) Tractor & tank

(3) Truck (4) Irrigation (5) Other

9. Method of Incorporating Manure Into Soil

50

(1) Cultivation by plow or disc (2) Injection

(3) No particular method (4) Other (5) None

10. When is Manure Spread on Land

(1) All year (2) Summer (includes late spring & early fall)

(3) Winter (snow)

51 ☐

11. Are Disposal Areas Subject to Run-off

(1) YES (2) NO (3) DO NOT KNOW

52 ☐

12. Where Does Run-off From Disposal Areas Go

(1) To undrained slough or flat on own farm

(2) To undrained slough or flat near farm

(3) To slough or depression which has drainage when full

(4) To slough or flat not on farm which overflows

(5) To creek, ditch, watercourse or other surface water off farm

53 ☐

LAGOON DETAIL

1. Type of Lagoon

(1) Constructed (2) Natural (3) Both

54 ☐

2. Seepage Control

(1) Constructed lining (2) Assurance of clay bottom

(3) None

55 ☐

3. Where Does Overflow Go To

(1) Slough or flat on own farm

(2) Slough or watercourse with intermittent drainage off farm

(3) Slough or watercourse with continuous drainage off farm

(4) Other

56 ☐

4. How is/or will Lagoon be emptied

57

(1) Drain (2) Overflow (3) Pump

(4) Irrigation (5) Solid manure methods

5. Surface Area of Lagoons is (sq.ft.)

(1) Less than 2,000 sq.ft. (2) 2,000-5,000 sq.ft.

(3) 5,000 - 10,000 sq.ft. (4) 10,000 - 50,000 sq.ft.

(5) More than 50,000 sq.ft.

58 59 60 61 62

6. Average Depth of Lagoons are (ft.)

(1) Less than 3 ft. (2) 3 - 5 ft. (3) 5 - 10 ft.

(4) 10 - 15 ft. (5) More than 15 ft.

63 64 65 66 67

7. Approximate Capacity of Lagoons (cu.ft.)

(1) Less than 10,000 cu.ft. (2) 10,000-20,000 cu.ft.

(3) 20,000-100,000 cu.ft. (4) 100,000-500,000 cu.ft.

(5) More than 500,000

68 69 70 71 72

8. Length of Time Required to Fill Up Lagoons if They Were Empty (months)

(1) Less than 6 mos. (2) 6 - 12 mos. (3) 12 - 24 mos.

(4) More than 24 mos. (5) DO NOT KNOW

73 74 75 76 77

COMMENTS

78

1. Has farmer ever encountered any complaints related to manure management

   (1) YES (2) NO

2. If so, who from:

   (1) Neighbouring farm residence
   (2) Neighbouring country residence
   (3) Public facility
   (4) Industrial facility
   (5) Neighbouring town or city residents
   (6) Other

79

3. What was alleged nature of complaint:

   (1) Odor (2) Flies (3) Run-off (4) Other

80

4. In farmers terms, what are his problems in the area of Animal Waste Management

   (a) Barn Systems

   (b) Disposal

   (c) Equipment

5. What is farmers comments with respect to Pollution Regulations and Legislation?

6. General Comments

SKETCH OF FARM (if needed to describe situation more fully)

WATER SHED & SURVEY AREA CODE NUMBERS

1. LETHBRIDGE

1. Oldman River
2. Willow Creek
3. Waterton River
4. Little Bow
5. St. Mary River

2. CALGARY

1. Bow River
2. Elbow
3. Fish Creek
4. Nose Creek
5. Highwood River
6. Pine Creek
7. Ghost River
8. Horse Creek
9. Bighorn Creek
10. Grand Valley Creek

3. RED DEER-LACOMBE-PONOKA-OLDS

1. Red Deer
2. Raven River
3. Medicine
4. Little Red Deer
5. Waskasoo
6. Blindman
7. Battle River
8. Haynes Creek
9. James River
10. Dogpound Creek
11. Rosebud River

4. EDMONTON

1. North Saskatchewan
2. Sturgeon
3. Whitemud Creek
4. Redwater River
5. Strawberry Creek
6. Conjuring Creek
7. Ross Creek
8. Beaverhill Creek

CAZALEN 90
72137